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EDITORIAL.

Marketing Fruit.

The organisation of the marketing of fruit in Malaya has long been recognised as a problem of considerable difficulty, by reason of the fact that there are few economic areas under one variety, fruit trees of numerous varieties are very scattered and many areas are not readily accessible to market centres. For these reasons, and also on account of the necessity for good marketing and transport facilities, fruit cultivation is apt to languish and be restricted to the provision of supplies for sale in the immediate neighbourhood in which they are grown.

While the above is generally true of Malayan conditions, it is not forgotten that there are exceptions; notably, the marketing of fresh pineapples from the extensive areas in Johore and to a less extent in Selangor; bananas from certain areas in Negri Sembilan and elsewhere and duku and other fruits from the old-established orchards in Malacca.

The organisation of fruit marketing demands a precise knowledge of the extent of the planted areas and the kinds of fruits grown thereon throughout the producing districts and an efficient system of marketing intelligence. Given this organisation, it may become possible to arrange distribution of fresh fruits to markets in which there is a shortage of supplies—although such shortage may be of but a temporary nature.

Furthermore, the marketing locally of fresh fruits in good condition necessitates adequate and rapid transport facilities. This fact handicaps the marketing of fruit from the less accessible areas, on account of time taken in bringing the produce to market and expense of transport.

The present organisation of the Department of Agriculture precludes any extensive work being undertaken on the organisation of the marketing of fruits. As a preliminary, however, a survey is being undertaken regarding the kinds of fruits grown in different areas, the amount of surplus fruit available from time to time and the present marketing methods. A survey of the areas in Malacca was undertaken some time ago and the result published in this journal in February 1933. In the present number will be found a record of a somewhat similar survey of the areas in Pahang. It is hoped that the survey may

be extended to other States in which fruit is at all widely grown. These records will serve as a basis for consideration of organising greater facilities for marketing fruits in the most favourable markets.

Attention is also drawn to an account in this number of an enquiry into the marketing of fresh bananas in the United Kingdom and Australia. It is concluded that on account of distance from the market, transport difficulties and the existance of sources of supplies more favourably situated, there is at present no likelihood of markets developing for Malayan bananas in these centres.

Field Experiments.

Included in the present number is an article setting forth the standard methods used in laying out field experiments. This Department frequently cooperates with estates in the conduct of experiments. Such experiments are normally devised and supervised by a scientific officer, but the actual conduct of the work and the harvesting of the crops is frequently in the hands of the owner or manager of the property. The success of the work depends on the amount of care and supervision which the man on the spot can give, and we take this opportunity of recording our grateful thanks to the numerous practical men who have assisted us in this respect from time to time.

In order that field experiments may be critically examined, it is essential that the standard methods be closely followed. Much experimental work by non-technical men—and let it be acknowledged, by technical bodies too—has proved useless because the investigator has not taken precautions to obviate variations in results due to factors other than those under investigation.

It is thought that the account here given will be acceptable to those who kindly assist us in our investigations and may be of use to others who desire to undertake independant investigations with field crops.

Diseases of Tobacco.

Included in this number is an article which summarises our present knowledge of diseases of tobacco in Malaya. On account of the increasing area under cultivation with this crop in Malaya, diseases assume greater significance. By the nature of these diseases, especially of slime disease, it is most important that the grower should take precautions against their spread; neglect in this respect may seriously prejudice the industry in the future. Adequate control necessitates early recognition of the symptoms, and for this reason, the notes on this subject, which we here publish, are commended for the close attention of cultivators.

In passing, readers are reminded that an article dealing with the insect pests of tobacco in Malaya was published in this Journal in February, 1933.

Original Articles.

DISEASES OF TOBACCO IN MALAYA

BY

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Introduction.

The tobacco plant is subject to many diseases caused by the attack of parasitic fungi and bacteria, and there is considerable information available from tobacco-growing countries relating to these maladies. In Malaya, where interest in the cultivation of this crop is of recent date, information regarding local diseases is as yet scanty.

Two of the most prevalent diseases are slime disease and leaf spot. In addition to these diseases which are caused by micro-organisms, some diseases of obscure nature have been recorded from time to time. In these cases, the trouble may take the form of malformations of the leaves, chlorosis (yellowing) or mottling, and while, in some instances, it is probable that a disease of the nature of a virus disease, such as ordinary "mosaic" disease, is responsible, in other cases it is probable that the abnormalities are due to deficiency in an element or elements of plant food, or to environmental conditions.

Slime Disease.

This disease is the most serious disease of tobacco plants in Malaya.

Symptoms.—Some of the leaves on a plant infected with slime disease begin to wilt and during the hotter part of the day will hang limply down the stem. During the night these leaves may recover their turgidity to a certain extent, but on the following day they will again wilt and every day a larger number of leaves will show similar symptoms until in about one week all the leaves and the top of the stem are wilted and the plant finally dies.

The stems of affected plants may not exhibit any abnormal symptom in the early stages of the disease, but as the disease progresses, a brown and finally a black discolouration becomes evident in the tissue of the stem.

The roots of diseased plants may not appear to be diseased, but when the disease becomes evident in the leaves some of the roots may be discoloured brownish-black and the tips may be decayed.

If the stem of a diseased plant is cut across close to the ground, there is usually a brownish ring present just beneath the epidermis, in the vascular system. In very early stages of the disease, this brown ring may not be developed, but when several leaves have wilted it is normally present. On squeezing the cut stem, a dirty-white slime exudes from this ring, especially in fairly advanced cases.

This slimy fluid contains millions of bacteria which plug the food-conducting vessels in the stem and roots, thus interfering with the circulation of the sap. The bacteria also produce a toxic substance and this, combined with the plugging of the vessels, causes the plants to wilt.

The organism.—The organism, which lives in the soil, is a short-rod bacterium—*B. solanacearum* E.F.S; it has been recorded as a parasite of many species of plants. In addition to attacking tobacco, the organism is the main cause of the well-known wilt of tomato plants in this country, while it is also known to attack groundnut, brinjal, arrowroot, chilli, petunia, and potato and possibly can attack many of the local species of *Solanaceae*.

The Disease in the Nurseries and in the Field.—The bacterium enters a plant by means of the roots, probably through small wounds, and multiplies rapidly in the vascular system, secreting substances that are poisonous to the plant. Plants may be attacked at any stage of growth, but very young seedlings are rarely affected. When the plants in a nursery bed are ready to transplant, some of them may show signs of infection, but frequently the disease does not appear until the plants have been transplanted into the field. Jochems (1) states that this seed-bed infection usually appears in the nurseries when the roots of the older seedlings have penetrated into the lower unsterilized layers of soil. In seedlings taken from infected nurseries, symptoms of the disease may appear within a few days after transplanting, whereas if healthy seedlings are planted in infected soil, 3 to 4 weeks may elapse before the first symptoms appear.

The disease can spread from infected plants to adjoining healthy plants which may not show the symptoms for some weeks. Consequently, although the initial mortality in a plot of young plants may be slight, a few weeks later many of the plants may become affected. In some plants of the Joyner variety grown locally, the disease appeared just before the plants were topped. A knife was used for topping and within a few days it was noticed that a black discolouration was extending down the cut stem and passing into the lower leaves of formerly healthy plants. It is probable that the knife became infected through cutting a diseased stem and thus transmitted the infection to healthy stems.

When an area is planted with tobacco for the first time, slime disease may not appear unless the land had been used recently for the cultivation of other susceptible host plants. If the tobacco crop shows no infection and if the land is cleared of the old plants when the crop is harvested, it is often possible to grow other crops of tobacco until the disease appears.

When the disease appears, the mortality may be as low as 10 per cent. in the first crop, but subsequent crops may be completely wiped out and the land cannot be used again for tobacco cultivation until it has been allowed to lie fallow for some years, and specially treated so as to suppress solanaceous weeds.

(1) Jochems Dr. S. J. Med. v.h. Deli Proefstn. 43. Ser. 2. 1926.

If susceptible host plants are not permitted to grow in infected soil, the bacterium loses virulence after a period of some years and a crop of tobacco can again be obtained.

In Netherlands India where there are large areas under tobacco cultivation and where slime disease has caused considerable damage, it is the practice to adopt a seven-or eight-year rotation, sometimes with rice and maize which are immune from the disease, or with *Mimosa invisa* which helps in suppressing susceptible species and is itself immune.

So far as is known, all varieties of tobacco can be attacked by slime disease. The varieties on which the disease has been recorded in Malaya are—Deli, Burmese, Joyner, Hickory Prior, White Burley, Russian, Bhengi, and Ceylon.

The problem of controlling soil-borne diseases is always difficult and expensive, when varieties resistant to the disease are not available. So far, no strains of tobacco fully resistant to slime disease have been discovered or produced by selection or breeding.

Slime disease is said to be more virulent on some types of soil than on others. According to Jochems, (*loc. cit*) crops growing in red laterite soil nearly always suffer badly from slime disease, but it is not yet clearly ascertained to what properties the enhanced liability of some soils to this disease is due.

Control Measures: *Prevention.*—It is very desirable that land which is free from slime disease should be protected, as far as possible, from becoming infected. Infection is certain if diseased seedlings are planted, and consequently one of the most important preventive measures is to sow the seed in nursery beds of sterilised soil, or in soil which is known to be free from the disease. Seedlings from infected nurseries should not be planted in the field.

One method of sterilising infected soil in nursery beds is by steam. Chemical disinfectants have so far been found of little use, not only on account of the cost and the difficulty of application, but also, in some cases, on account of inefficiency.

In order to steam-sterilise a seed-bed, a portable boiler and an inverted pan made of re-inforced galvanised iron can be used. The size of the pan varies according to requirements, a convenient size being 6 feet by 12 feet by 8 inches high. The pan is placed over the soil and pressed into it and steam is passed into the pan through a hose pipe at a pressure of about 80 lbs. per sq. in., by means of an inlet in the top of the pan, and the soil is steamed for about 30 minutes. The pan is then moved along the seed bed until all the soil has been steamed.

Steam sterilisation, however, is considered to be an impracticable method on the large nursery areas of the tobacco estates in Sumatra and it is out of the question for small-holders to adopt this method.

The practice of burning brushwood and grass on the surface of the soil of the seed bed is only partially successful, and better results would probably be obtained if the top soil could be removed, the lower layers surface fired, and the top soil fired when it is replaced on the bed. At present this appears

to be the only practicable method of soil sterilisation available for small-holders. In addition, the seed-bed should be raised so that contamination, by rain water flowing from adjoining and possibly infected soil, would be minimised.

On larger properties, the site of the nurseries should be changed frequently. After the seedlings have been removed, the soil should be fired and kept free from susceptible weeds by planting with a cover such as *Mimosa invisa* and allowed to lie fallow for as long a period as possible.

If seed-boxes are used for the growing of seedlings, the boxes should be discarded or else washed, inside and outside, with a disinfectant; *e.g.* 5 per cent. Izal, before they are used again.

Control in the Field.—Local experience with tobacco cultivation has shown that there is reason to expect that slime disease can cause as serious damage in Malaya as it has caused in Netherlands India, and in certain other countries. As mentioned above, the practice of rotation with rice and maize as well as *Mimosa invisa* over a period of seven to eight years is considered necessary in the large tobacco areas in Sumatra, and the possibility that a similar practice will be found necessary in Malaya should be borne in mind, if the establishment of any large areas devoted to tobacco cultivation is contemplated.

In the case of tobacco cultivation by small-holders, the problem is complicated by the small size of the holdings. Many small holdings are as yet free from the disease, but on holdings where it has occurred the mortality has been heavy.

When the disease makes its appearance, the infected plants should be dug out as soon as they are observed, removed to a safe place and burnt.

If diseased plants are not removed, the adjoining plants will almost certainly become affected, whereas there is a chance of saving healthy plants if diseased plants are quickly removed. It is also advisable if only a few plants are affected, to remove the soil beneath diseased plants and to discard it in a safe place, taking care to avoid scattering it in the planted area during removal. If possible, on small plots the soil should be fired; solanaceous crops should not be planted or permitted to grow in this soil for as long a period as possible.

Plants grown in badly-drained soil are more likely to become infected than those in well-drained soil. Consequently, it is important that the land should be adequately drained. Drainage alone will not eradicate the disease, but the number of casualties is frequently less on well-drained soil.

Finally, it is very important that all the old tobacco stalks should be removed from the land, and burnt, as soon as possible after harvest.

Leaf Spot.

Tobacco plants in Malaya are very frequently affected by a leaf disease caused by the fungus *Cercospora nicotianae* Ell and Ev.

The spots are at first small and round, brownish in colour and are first noticed on the older leaves. Later, some of the spots may coalesce and they gradually become white in the centre, concentrically zoned and finally dry up.

The disease is not regarded as serious in this country, since little damage is caused except when the leaves are intended for use as cigar or cheroot wrappers. In Rhodesia, however, the disease is said to lead to black spotting in the barns on flue-cured varieties.

Control.—Early removal and burning of the lower, infected leaves will keep the disease in check. Burgundy mixture sprayed on to the leaves of young plants is also beneficial.

Mosaic Disease.

Mosaic disease is an infectious disease which is readily transmissible to healthy plants from diseased plants. It belongs to the group of diseases known as virus diseases, and is due to the attack of a parasitic micro-organism.

The most characteristic symptom is a mottling of the leaves with irregular patches of light green and dark green, sometimes accompanied by blistering, curling, and distortion of the leaves.

The effect of the disease is to reduce the yield and quality of the leaf.

The disease is not seed borne, but it may appear in the nursery beds and, since it can be transmitted merely by touching a diseased plant and then touching a healthy plant, it may be spread to a number of plants during transplanting.

The disease is spread in the field mainly by handling when priming is first done, or when the plants are being examined for the presence of leaf-eating caterpillars.

Symptoms of the disease are not produced in the leaves already formed on a plant at the time the infection occurs, but appear in the leaves formed subsequent to infection, or in the suckers formed after topping. Nevertheless, the infection is present in all parts of the plant, except the seeds.

The infective principle can persist for years in dried tobacco leaves, and is not rendered inactive during the manufacturing process. Consequently, infection can be transmitted by workers using infected tobacco or snuff.

Fortunately, the disease does not infect the soil in which affected plants have been grown.

Control.—The symptoms of mosaic disease in infected seedlings are not very marked, and it is not always possible to ensure that all infected seedlings have been removed from the seed-bed before transplanting begins.

Prevention of seed-bed infection is, therefore, an important measure. This is best accomplished by locating the seed-beds at some distance from areas where tobacco is growing, by keeping down weeds in the seed-bed and in the neighbourhood of seed-beds, since some of these weeds may be susceptible to mosaic disease and it may spread to the tobacco seedlings. Muslin covers used on seed-beds should be boiled and dried before they are used again. All tobacco stumps and refuse should be removed from the land after harvest, so that infected plants will not be a danger to nearby seed-beds.

If the disease is found in the seed-bed, the infected plants and those in immediate contact with the infected plants should be carefully removed and burnt. The hands of the workers should be well washed and dried, immediately this is completed, and they should not handle the healthy seedlings when removing the infected plants. If there are numerous cases of mosaic infection in a seed-bed, it is advisable to destroy all the seedlings and obtain supplies from elsewhere.

In the field, infected plants should be removed quickly and carefully before the workers begin to handle the plants when looking for caterpillars.

General.

The diseases mentioned above are the only ones so far investigated on tobacco in Malaya. It is almost certain that others occur, but they have not yet been definitely recorded.

Among the diseases which may be expected to appear the following are the most important.

(*a*) Damping-off of seedlings caused by Fungi. *Rhizoctonia solani* causes a disease in which patches of seedlings die off and are attached to the soil by whitish-yellow mycelium which looks like a spider's web, and which can be seen in the early morning. *Phytophthora* sp. also kills very young seedlings in patches. In older seedlings the fungus may appear on isolated plants the stems of which turn jet-black, but do not exude slime when squeezed. These diseases can be controlled by spraying the seedlings periodically with weak Bordeaux (or Burgundy) mixture to which it is advisable to add 1 per cent. solution of lead arsenate to assist in controlling caterpillars. It is also important to prevent waterlogging of the soil, and to permit sunshine and air to have access to the plants.

(*b*) Stem Scorch.

Stem scorch caused by *Phythium* spp. is a disease which attacks the stems of the plants just below soil level, causes them to rot and the plants to fall over, or wither. The stem is markedly constricted at the point of attack.

The disease is only serious in wet weather, and on land on which plants of *Leucæna glauca* or *Phytolacca octandra* have been growing for some time.

The dead plants should be lifted and destroyed and replaced by seedlings which are older than those normally used for transplanting, and watered only once directly after planting. The planting hole should be deeper than usual and should not be filled in for about a week.

(*c*) Collar disease caused by *Sclerotium Rolfsii*. This disease usually appears soon after transplanting and corrodes the bark in as far as the wood of the stem just at and below soil level.

The disease is easily identified by the white mycelium, covered with small, white or brown sclerotia, which is attached to the stem.

The disease is said to cause little damage, but it is likely to be more serious in land formerly used for the cultivation of Jerusalem artichoke, or groundnuts.

(*d*) VARIEGATED LEAVES. Sometimes plants appear with variegated spots in the leaves, so that occasionally the leaves are almost white. These leaves remain variegated during and after curing and so are valueless. The phenomenon is hereditary and consequently seed should not be collected from such plants.

Summary.

Some local diseases of tobacco are described and control measures recommended.

Brief mention is made of diseases which have not yet been recorded in Malaya, but are probably present and are likely to require investigation if tobacco cultivation extends.

SURVEY OF CULTIVATED FRUITS IN PAHANG 1933

BY

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Towards the latter part of 1932, a preliminary fruit survey was conducted in the District of Temerloh, Pahang. In this instance one holding only was examined from each mukim.

As a result of the information obtained, it was decided to extend operations during 1933 to embrace all Districts in Pahang and, where possible, to increase the number of holdings examined to four from each mukim. At the same time, a census of cultivated fruits was undertaken and has revealed the presence of a very much larger acreage than that previously estimated.

Methods Employed.

Pahang is divided into six administrative districts, each of which has been examined separately. A total of 224 holdings were inspected, representing an average of slightly less than four holdings from each mukim.

The distribution of number of holdings examined is as follows:—Lipis 56, Raub 28, Bentong 12, Temerloh 60, Pekan 60, Kuantan 8.

A field form similar to that utilized for the Malacca Survey was prepared, but it was found necessary to apply certain modifications to meet local conditions.

Each of the holdings selected was examined by the Malay Agricultural Assistant in charge of the District, who recorded the information on the field forms. Re-surveys were performed from time to time in order to check the work as a result of which it was found that the information recorded was reasonably accurate.

Information Sought.

The principal information sought was as follows:—

(*a*) The average size of fruit holdings and to what extent acreage varies according to proximity to market.

(*b*) An accurate estimate of the actual acreage of cultivated fruits.

(*c*) The average yield per acre of the various cultivated fruits.

(*d*) The estimated cash return per acre from the various Districts.

(*e*) General condition of cultivation.

(*f*) To obtain information as to what districts would be most likely to benefit from increased fruit cultivation.

(*g*) Districts from which a surplus of fruit is invariably produced.

(*h*) Districts which produce insufficient or only just sufficient fruit to satisfy their own requirements.

(*i*) What marketing facilities exist for the disposal of surplus fruits.

In newly planted holdings more attention is paid to cultivation and this may be attributed largely to the practice of cultivating catch crops such as banana, pineapple, sugar cane, tapioca and miscellaneous vegetables during the early growing period of the main crop.

As a result of the census of areas of cultivated fruits taken, excluding coconuts, pineapples and bananas, it has been found that very great discrepancies have occurred in past returns, the total planted acreage being 4117 acres as against the previous estimate of 1065 acres.

There is some considerable variation in yields per acre of the cultivated fruits as amongst districts and it is not considered that, in many cases, this information can be treated as being more than very approximate. Considerable difficulty was experienced in obtaining any information on this matter as cultivators generally appeared unable rather than unwilling to estimate past returns. In order to obtain reasonably accurate yield figures, a smaller number of holdings have been selected from each district and actual yields are to be recorded over a period of years.

General Information Obtained.

Size of Holding and Density of Planting.

Practically all Malay holdings possess a few varieties of fruit, but fully-planted holdings are, as a rule, only met with in Districts situated in close proximity to a ready market.

The fruits most commonly planted are shewn in Table II. The number of holdings on which the chiku, (*Achras sapota*), pulasan, (*Nephelium chryseum*) and duku, (*Lansium domesticum*) were found under cultivation was so small as to render impossible the inclusion of these types amongst the local cultivated fruits. These fruits find a ready local market and there is room for a limited expansion in their cultivation.

The size of holdings varies from under 2 to 4 acres, but is usually between 2 and 3 acres in extent. Proximity to a market does not necessarily mean larger holdings as is shewn by the fact that the average size of holding in Bentong situated near to a ready market is 2 acres, while in Lipis with a less ready market, the average size of holding is 2.25 acres. The average size of holding in other Districts is as follows:—Raub 2.25 acres, Temerloh 1.75 acres, Pekan 4 acres, Kuantan 2.75 acres.

The larger average size of holding shewn for Pekan is due to the inclusion of a number of relatively large holdings situated in the vicinity of the town of Pekan, and it must not be assumed that holdings in this District are generally larger than obtain in other Districts.

In areas situated close to markets, the density of cultivation is much greater than is the case in holdings not so favourably situated.

Condition of Holdings.

Planting is usually of a haphazard nature and, undoubtedly, a very considerable number of trees in the older plantations are self-sown. On more recently planted holdings, however, attention has been paid to lining and holing.

With a few exceptions, fruit holdings once established are almost entirely neglected, no cultivation in any form being practised. In some instances, however, new plantings receive some care during the early stages of growth. Excessive undergrowth is periodically cut back and, in some cases, attempts are made to protect the crop from the ravages of pests, such as squirrels. Manuring is seldom practised on mature holdings, except where livestock are allowed to roam over the holdings and thus to supply a small amount. Rubbish, grass cuttings and ashes are, in some cases, used to fertilise new plantings.

Knowledge of marcottage is fairly general, but with a few exceptions, has not been practised to any large extent.

The demand for good fruit stock is increasing, but the actual number and variety of plants ordered indicate that cultivation is intended for home consumption rather than for marketing purposes.

Marketing.

Most surplus fruit, if sold, is disposed of at the roadside to travelling dealers. The unit of production, with few exceptions, is too small to allow of good prices being obtained, but in the case of roadside sales, this is sometimes overcome by producers arranging to take their produce to a definite place on a certain date, thereby obviating the necessity for a dealer to visit several places before he can obtain sufficient supplies to meet his requirements.

Marketing facilities are extremely poor and the producer is entirely at the mercy of the buyer, but it must not be overlooked that the buyer in Pahang often takes greater risks than is the case in other parts of the country. As an example, lorry drivers returning to Kuala Lumpur with only a small load or no freight at all, often purchase considerable quantities of fruit, which they hope to sell at a profit on arrival in Kuala Lumpur.

The practice of bringing all produce to certain places along the roadside for sale results in slightly better returns to the producer, as the purchaser can than obtain his requirements from one or two centres and thus save both time and money. No attempt at co-operative selling is undertaken in conjunction with this form of collective selling, each cultivator disposing of his own produce, but the mere fact that the purchaser has a number, instead of one individual to deal with, reacts to the benefit of the producer.

The formation of "Weekly Fairs" has improved the marketing facilities. This is most noticeable in the case of the very small producer, whose crop would be insufficiently large to warrant the expense of transporting it to any of the larger markets. Retail prices in the local town and village markets are invariably higher than prices at "Weekly Fairs".

Table I.

Order of Popularity of Fruits as amongst Districts and Percentage of the Total Holdings on which Individual Fruits are Planted.

LIPIS		RAUB		BENTONG		TEMERLOH		KUANTAN		PEKAN	
	%		%		%		%		%		%
Coconut	94	Rambutan	100	Banana	91	Coconut	100	Mango	87	Coconut	96
Langsat	91	Durian	96	Jack Fruit	91	Jack Fruit	78	Rambutan	75	Mango	83
Durian	87	Banana	93	Coconut	83	Rambutan	75	Durian	75	Jack Fruit	79
Rambutan	82	Coconut	89	Rambutan	83	Mango	68	Rambai	75	Rambutan	71
Jack Fruit	78	Langsat	89	Durian	83	Banana	66	Coconut	50	Mangosteen	68
Mangosteen	75	Mangosteen	85	Mango	75	Mata Kuching	56	Mangosteen	37	Banana	68
Bachang	64	Bachang	78	Mangosteen	66	Langsat	53	Jack Fruit	37	Rambai	66
Mata Kuching	64	Mata Kuching	78	Pineapple	66	Durian	50	Bachang	37	Jering	56
Mango	63	Jack Fruit	75	Bachang	66	Bachang	46	Langsat	25	Bachang	53
Pomelo	60	Rambai	71	Jering	66	Mangosteen	41	—		Durian	50
Jering	53	B. Buloh	60	Langsat	58	Rambai	41	—		Pineapple	33
Blimbing Buloh	52	Jering	57	Rambai	58	Pomelo	33	—		Pomelo	31
Rambai	51	Pomelo	50	B. Buloh	50	B. Buloh	33	—		B. Buloh	20
Banana	50	Mango	39	Pomelo	50	Jering	21	—		Langsat	10
Pineapple	25	Pineapple	25	Mata Kuching	33	Pineapple	16	—		Mata Kuching	6

Table II.

Fruit Survey, Pahang.

Average stand of fruit trees and estimated yield and cash value of crops.

Name of Fruit	Yield stated in terms of	LIPIS DISTRICT			RAUB DISTRICT			BENTONG DISTRICT			TEMERLOH DISTRICT			PEKAN DISTRICT			KUANTAN DISTRICT		
		Average Number Plants Per Acre	Average Yield Per Acre Per Annum	Gross Cash Value Per Kampong $	Average Number Plants Per Acre	Average Yield Per Acre Per Annum	Gross Cash Value Per Kampong $	Average Number Plants Per Acre	Average Yield Per Acre Per Annum	Gross Cash Value Per Kampong $	Average Number Plants Per Acre	Average Yield Per Acre Per Annum	Gross Cash Value Per Kampong $	Average Number Plants Per Acre	Average Yield Per Acre Per Annum	Gross Cash Value Per Kampong $	Average Number Plants Per Acre	Average Yield Per Acre Per Annum	Gross Cash Value Per Kampong $
Coconut ...	nuts	21.8	1024	25.62	16.0	1024	20.48	23.08	715	21.45	23.10	1155	8.00	35.20	2647	26.50	10.1	30	3.03
Mangosteen ...	fruits	1.0	450	1.32	1.9	665	1.06	1.46	156	.39	.59	413	1.38	1.50	750	1.35	.5	270	.27
Rambutan ...	,,	4.0	2800	2.80	7.2	94	6.58	19.25	38,500	77.00	2.01	4020	4.02	1.20	4000	2.40	2.0	1100	2.20
Banana ...	bunches	9.5	9	1.08	30.0	30	3.00	75.16	73	7.30	13.02	13	1.36	24.60	24	2.40	—	—	—
Pomelo ...	fruits	1.0	60	3.00	.5	55	1.48	.87	17	.85	.29	15	.30	.25	21	.60	—	—	—
Pineapple ...	,,	6.6	6	.12	11.4	11	.11	30.58	30	.60	4.00	4	.16	44.67	44	1.32	—	—	—
Durian ...	,,	3.3	742	44.50	4.5	100	45.00	7.66	1530	76.50	1.26	277	27.70	1.15	126	7.56	10.0	125	62.50
Jack Fruit ...	,,	3.5	28	5.00	1.6	10	3.20	4.75	24	4.50	2.21	38	5.70	2.20	22	2.42	.8	12	1.00
Langsat ...	gantangs	7.4	133	13.30	9.2	11	15.15	12.46	498	49.80	2.71	54	5.40	.50	7½	1.08	.5	20	1.50
Rambai ...	,,	.7	21	1.05	.2	18	.32	1.25	87	4.35	.61	12	.96	.85	34	1.70	1.4	40	2.80
Bachang ...	fruits	1.3	150	1.50	1.6	250	4.00	1.25	297	.90	.63	139	1.39	.42	193	.60	.2	150	.15
Blimbing Buloh ...	gantangs	.9	6	.36	.1	8	.08	.41	300	.30	.31	1	.09	.12	½	.02	—	—	—
Jering ...	fruits	.7	287	.28	.1	500	.05	1.16	1740	1.74	.23	184	.18	.57	513	.37	—	—	—
Mata Kuching ...	gantangs	1.2	18	4.50	3.4	12	13.65	1.00	70	14.00	1.31	33	6.60	.20	5	1.00	—	—	—
Manggo ...	fruits	1.9	190	1.90	.1	130	.06	2.26	1380	13.80	1.41	570	2.85	1.22	732	1.83	3.8	275	5.25
Total ...		6.48		106.36	87.8		114.82	180.60		273.78	53.42		66.09	114.65		51.15	29.3		78.79

Grading of produce is never undertaken and it is extremely doubtful whether, with the present marketing conditions, grading would result in any increased returns but, if any improvements are to be attained, some degree of grading will be found essential.

Organised co-operative sales—other than collective sales at roadside—have never been attempted.

The cash returns per acre appear high owing to the high yield figures given. Undoubtedly, a very useful additional income can be obtained from fruit holdings situated close to a ready market and this fact has undoubtedly been recognised by producers as is shown by the density of cultivation on such areas, when compared with other more isolated districts.

It has been stated that practically all Malay holdings include a certain amount of fruit cultivation, but there is one rather curious exception which occurs on the East Coast of Pahang. In most of the mukims south of Kuala Pahang the main source of income is derived from fishing and little if any attention is paid to agricultural undertakings, but the mukim of Endau, which is the most southerly of the coastal mukims, possesses fairly extensive areas of fruit cultivation, the surplus from which is disposed of in the mukims of Pontian, Rompin and Bebar where fruit cultivation is entirely lacking.

Little if any reliable information on the question of indebtedness of cultivators is available, individuals generally being disinclined to reveal such personal matters. The general impression formed is that indebtedness is not excessive.

Conclusions.

There is not scope, under existing conditions of population, for immediate large-scale expansion in fruit cultivation; as the country develops, however, gradual and continuous expansion should take place. At present, opportunities exist for small-scale expansion and particularly for the introduction of certain types of fruit at present sparsely cultivated and for which a ready market exists.

There exists a demand for good planting material of good types and every endeavour should be made to meet this demand for new plantings.

Cultural methods leave much to be desired, but there are indications of a very slight improvement as a result of past teaching and persuasion.

The marketing of small-holders' fruit, as of other produce, leaves much to be desired, but it appears that any general improvement can be obtained only by a Malayan campaign, as any attempt to improve conditions in any one District—or for that matter State—would come up against the interests of the middleman and retailer and would therefore be likely to suffer a boycott if supplies were available from other sources.

THE LAYOUT OF FIELD EXPERIMENTS

BY

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The results of field trials and their significance are frequently recorded in this Journal; the object of these notes is to explain why modern field trials are made along certain defined lines and what type of result is to be looked for.

A field trial has always the some object in view, namely, to ascertain whether one variety or strain of plant, or operation such as manuring, cultivation, drainage, spacing, method of sowing or pollination is better than another used under similar conditions.

For convenience in the following discussion the word "treatment" is used to cover any of these.

No field trial can give absolutely certain results. All that can be done is to arrange matters so that the *probabilities against* an increase or decrease shewn by one treatment over another being due to chance shall be great enough to amount to practical certainty under the particular conditions of the experiment. For general purposes it is considered sufficient that this chance should be five in one hundred.

Simple Layouts.

The simplest possible form of trial is one in which some one treatment is compared with a control in a contiguous plot without repetition.

Let it be supposed that the treatment does in fact yield twice the crop of the control. This increase may be due to treatment but might as easily be due to differences in the original fertility of the two plots. There is nothing in the results to shew which is the cause of the difference. Some light would be thrown on the matter by repeating the experiment with the plots reversed, but as the new control plot had undergone a treatment previously, the issue would be confused. An alternative might appear to be to record yields in the first season and use these for controls for the next. The great objection to such a course is the unknown effect of the season on the plots. With differing conditions of temperature and rainfall, the results of the first season's observations might be confuted by the results obtained by a second season of such preliminary observation. In any case, by either of the methods considerable time is wasted.

Variation.

Let it be supposed that an experiment is concerned with a square piece of land 1 acre in area divided in one direction only (horizontally or vertically) into eight strips, the first four of which are control and the second four manured.

(i) If the fertility is phenomenally even and all the control strips give the same results as each other exactly, as do also the manured strips, then the results so obtained are merely those obtainable by dividing the area into two halves only. The effect of this is considered below, under "size of plot".

(ii) If the fertility is such that it increases from plot to plot as one passes from the extreme control plot to the extreme treated plot then undue bias will be given to the manurial results while in the converse case the effect of the manure will be partially masked.

(iii) If the fertility is not even, then the control and manurial results will vary amongst themselves and a further problem arises, how to estimate the value of the manurial effect compared with these phenomena of variation. A high result in a control strip, or a low result in a manured strip, will obviously affect the utility of the average. Further, differences in results may be due to pests and diseases, both of which have a similar effect to differences in fertility. The experiment, therefore, must be laid out in such a manner that these phenomena of variation may be allowed for in any subsequent mathematical examination of the utility of the average or mean.

Randomisation.

In (ii) above it was supposed that the fertility increased across the strips and although it lent a bias to the results it was nevertheless recognisable. If, however, the direction of fertility had been along the strips it would have passed unrecognised.

In laying out an experiment it is unlikely that it will be known in what direction this fertility drift will lie, but its presence will be observed if each strip is divided down its length into a number of plots, and these harvested separately, for then the fertility differences will become apparent no matter what is the general direction of the drift. An easier way appears to be to compare each treatment plot with the mean of the control on either side and this, in point of fact, has been advocated. The objection of such a method lies in the fact that if more than one treatment is considered the number of controls required is greatly increased.

The fertility variation is not likely to be graduated throughout the experimental area, but is likely to lie in patches; in cultivated soil as found in the farm lands of Europe, such patches are likely to be evenly distributed. On local soils which have not been subjected to centuries of cultivation—whether virgin jungle or carrying crops—the distribution is likely to be uneven.

To overcome this difficulty of patches of differing fertility, randomisation is resorted to, *i.e.* the treatment to be accorded to any given plot is chosen at random. Certain restrictions are frequently made, one of which is that if

RANDOMISED PLOTS

A	D	E	D	E
C	B	E	D	D
B	B	A	C	C
E	B	C	A	A
D	B	A	E	C

LATIN SQUARE

B	A	D	C	E
A	C	E	D	B
D	B	C	E	A
E	D	A	B	C
C	E	B	A	D

RANDOMISED BLOCKS

D	A	E	B	C
B	D	A	C	E
C	A	D	B	E
B	A	E	C	D
D	A	E	C	B

EXAMPLE OF COMPLEX EXPERIMENT CONFORMING TO THE LATIN SQUARE TYPE

A N PK NP NPK	D PK N NPK NP	B NPK NP N PK	C NP PK NPK N
D NP NPK PK N	C N PK NP NPK	A NP PK NPK N	B PK N NP NPK
C PK N NPK NP	B NPK NP N PK	D N NPK PK NP	A NPK NP N PK
B NPK NP PK N	A NP NPK PK N	C PK N NP NPK	D N NPK PK NP

possible, the number of control plots should be the same as the number of plots of any one treatment. This is not essential to the experiment, but is of great utility in simplifying the subsequent mathematical examination.

It frequently happens that the fertility patches (or gradients) are fairly large and while randomisation is necessary for the smallest units into which the experiment is to be divided, these large changes can often be dealt with, to some extent, by dividing the area into blocks in the expectation that differences in fertility will shew up in the differences of total yield for each block.

By dividing the area into blocks, fertility differences are eliminated in one direction only as will be seen from the accompanying diagram. Greater accuracy would be obtained if the blocks can be arranged in two directions. The best method of doing this is by the so-called Latin square arrangement in which the experimental area is divided into the same number of blocks in the horizontal and vertical direction as shewn in diagram. It need not necessarily be square in shape but it is essential that it shall be subdivided into the same number of plots in each direction. In order to distinguish the division into blocks in each direction, the horizonal division is spoken of as rows and the vertical division as columns. It so happens, in addition, that the total number of plots into which it is to be subdivided is usually the square of the number of treatments.

Within the block or within the column or row of the Latin square, the principle of randomisation will still hold, with the restriction that all treatments appear in each column and row or block the same number of times.

Analysis of Results.

Before proceeding to a discussion of such an analysis it is necessary to introduce the word "replicate", which is a term used to cover, in general phraseology, an undefined number of repetitions. If a treatment occurs three times then it is natural to speak of triplicates. Replicate cover all numbers.

How is the variation from plot to plot of the same treatment to be taken into account?

Since in Nature exact agreement of replicates can never be obtained, what is wanted is an estimate of the reliability of the means of the replicates of each treatment. As an example, suppose that the two following series are the results obtained.

1, 2, 1, 12	mean = 4
3, 4, 4, 5	mean = 4

The mean in each case is 4, but no one would hesitate in placing more reliance on the latter than on the former. A series of results in which differences from the mean are great should be made to carry less weight than a series where the individuals lie close to the mean.

This could be done, possibly, by summing differences from the mean, neglecting the + or — sign and dividing by the number of observations and calling it an error factor. For the above two series this would be

(*a*) $(3 + 2 + 3 + 8)/4 = 4.0$

(*b*) $(1 + 0 + 0 + 1)/4 = 0.5$

It is obviously possible to plot a curve, for any given series of results, of the values taken by the series against the number of times these values occur.

It can be shewn that, when the series can take any value (as against a discontinuous series), the frequency with which any value occurs will depend on the square of the difference of that value from the mean. Such a series is said to be normally distributed.

Consideration of the above two series will shew that such a curve can vary in its slope. What is wanted therefore is some non-graphical means of estimating this slope—or conversely, the extent to which values are scattered.

From the mathematical properties of this curve of normal distribution it can be shewn that the best estimate of scattering is given by the expression

$$\sqrt{\frac{\Sigma\,(m-x)^2}{n}}$$

This expression is called the standard deviation and is usually written as σ. "m" is the mean, "x" is any observation and "n" is the number of observations. Examination of the form of σ shews that the less the observations differ from the mean (the steeper the curve) the smaller the standard deviation, for in order to estimate σ each observation in a series is taken from the mean in turn and the difference is squared. The squares so obtained are added together and divided by the number of observations; finally the square root is obtained.

Further, the standard deviation provides an estimate of the reliability to be placed on the results; it is a measure of the likelihood of any result differing from the mean by a given quantity. It is possible to find the odds against any deviation from the mean (for example say 10 per cent.) exceeding a certain quantity by chance. The usual standard adopted is twenty to one *i.e.* only five times in a hundred that such results shall be chance ones.

σ has been derived from the curve for normal distribution.

In the case of a small series of observations, it is found that a better estimate of the standard deviation is obtained by dividing by "n—1" instead of "n".

Taking the two series above the standard deviations would be

(a) $\sqrt{(3^2 + 2^2 + 3^2 + 8^2)/(4-1)} = 5.4$ (approx.)

(b) $\sqrt{(1^2 + 0 + 0 + 1^2)/(4-1)} = 0.81$ (approx.)

The practical analysis of all experimental results in agriculture rests on the foregoing.

The researches of Fisher and others shewed that the variation in a field experiment could be divided into a number of parts and the residual variation could generally be reduced by eliminating variation due to known controllable factors. Field experiments may be grouped as follows :—

(*a*) Those in which there is complete randomisation of plots.
(*b*) Those in which plots are grouped into blocks.
(*c*) Those in which plots are grouped into a Latin square.
(*d*) Complex experiments in which two or more *types* of treatments are being studied simultaneously.

(*a*) If one treatment only were used in an experiment, no matter how many plots the land were divided into, it is obvious that all the variation which occurs would be due to differing fertility of the soil or individual plant differences. Such variation is spoken of as random or residual variation. If, however, there were two or more treatments, it is as evident that part of the variation is due to inherent differences between treatments. The residual variation, therefore will be the difference between the variation caused by treatments and the whole variation.

(*b*) In the case of experiments laid out in blocks, the total variation will be due not only to the causes outlined under (*a*) but also to the variation between one block and another, so that the residual variation will be the total variation less the variation due to treatment and the variation due to division into blocks.

(*c*) The same arguments apply to the Latin square, with the additional possibility of further reducing the residual or random variation by subtracting the variation due to columns.

(*d*) The complex experiment may conform to any of the above forms, but it is designed to answer more than one *type* of question at once *e.g.* the effect of cultivation and manuring.

In all the above cases it is desired to compare this residual or random variation with that due to treatments. In the case of the complex experiment this still holds good, but the variation due to treatments can itself be split up into separate parts due to each type of treatment and interaction between the types.

The usual estimate of the residual variation is called the random error and is in effect the Standard deviation of the residual variation.

Field experiments are not usually concerned with a single series, but are designed to answer the question of the reliability to be placed on differences of a number of treatments. The random error may be regarded as a measure of this. In order that one treatment may be considered significantly different

from another, it is necessary that the difference of their means should exceed the random error by an amount such that this excess could only occur by chance five times in one hundred trials.

For details of the working out of the random error by the elimination of variation due to blocks, treatments, etc. consultation should be made of the analysis of variance in R. A. Fisher's Statistical Methods for Research Students.

The Size of Plots and the Number of Replications.

A decision has always to be made, primarily, as to the size of the individual plots to be used and this will depend, to an extent, on the type of crop which is being studied, for with seasonal crops a large number of plants can be put in a comparatively small space compared with a permanent tree crop such as oil palm. Two factors are concerned, the larger degree of accuracy obtained from a larger plot owing to the fact that a larger number of plants approximate to the mean, a smaller degree of accuracy obtained owing to greater variations in soil the larger the plot. The most convenient way of determining this plot maximum in the first place is by preliminary observation of individual yields, in the case of crops such as oil palm, or of very small plots in the case of such annuals as rice.

From these observations an estimate may be made of the Standard deviation as defined above. Then from the same series of observations, by combining contiguous palms or plots, it may be determined up to what size of plot the standard error is continually and usefully reduced.

It is usually considered sufficient that the standard error should be below ten per cent.

It was pointed out above that in the Latin square type of experiment the number of replications is normally controlled by the number of treatments; in the case of a randomised block no such control exists but it will be realised that some determination must be made of the number of replications.

Still considering the standard error, it can be shewn that in a preliminary observational experiment with only two replicates, the standard error will be similar to the standard deviation and will be composed of the square root of the sum of squares of difference of the two replicates from their mean, divided by one.

If there were three replicates, the standard error would be the sum of the squares of the difference of three replicates from their mean, divided by two *et seq.*

Assuming that the differences from the mean are the same order in each case, the comparative figures for the standard error are shewn in tabular form below.

No. Plots	2	3	4	5	6	7	8	9	10
Comparative S.E.	1.00	0.85	0.82	0.79	0.77	0.765	0.757	0.750	0.746

From these figures it will be seen that whereas there is a drop of fourteen per cent. between two and three replications, there is only a drop of seven per cent. between three and five replications and a half per cent. between five and seven.

Hence there appears little to be gained by increasing the number of replicates beyond four or five.

(The process may be extended to cover more than one treatment).

The Effect of Seasons etc.

It should be quite clearly understood that the results of a given experiment only apply strictly to that experiment.

Different seasons might have a marked effect on a given experiment owing to the different reaction of different manures, varieties etc. to drought or excess rain or variations of light and heat.

If, therefore, very exact results are looked for, it will be necessary to repeat the same experiment over several seasons.

The seasonal means themselves can be submitted to a statistical analysis.

On the other hand, it must not be assumed that one season's trials are not very valuable. Difference of treatment may be so large as to leave little doubt of the significance in the case of annuals. In the case of permanent crops, in particular, it will be realised that even if the results for one season are highly positive, observations must be continued not only in order that the effect of differing amounts of rain, drought, light and heat may be studied, but also to obtain some idea as to the period of time over which a given treatment will be effective. Even such an observation as the latter may be repeated a number of times and these results of observations of the period of effective treatment can be analysed statistically.

Miscellaneous Articles

EXPORT MARKET FOR MALAYAN BANANAS.

The marketing of Malayan bananas in the United Kingdom is a trade that has been frequently suggested. It is as well therefore that those who contemplate development in this direction should be in possession of the facts. Readers of this journal who live in other tropical parts of the world, will appreciate exactly how far the conditions obtaining in Malaya are applicable to their particular circumstances.

The subject of banana export has recently invited renewed attention owing to the increased demand for the fruit in the United Kingdom. Shortage of supplies is the result of the recent hurricanes in the West Indies and of the incidence of Panama disease.

Incidence of Disease.

Panama disease, (*Fusarium cubense*), has been the cause of considerable anxiety in the West Indies since 1912, and it is estimated that in Jamaica, 15,000 acres have been lost to banana cultivation by infection, isolation under quarantine, or abandonment. Jamaica is combatting this disease by strict quarantine of infected areas and by raising immune varieties of bananas to replace the susceptible Gros Michel now generally grown throughout the Island.

Panama disease has been found in various parts of Malaya, but owing to the fact that there are several good commercial varieties which are not as yet affected with the disease, there is no immediate cause of alarm. Should, however, banana cultivation be extended for the purpose of export, it would be necessary to select a variety which is immune to Panana disease and which is acceptable on the market. The varieties which have proved to be most susceptible to the disease are Pisang Embun (the most important variety), Pisang Restali and to a less extent, Pisang Talon. Of those that are resistant or immune may be mentioned Pisang Mas and Pisang Serendah, the latter being one of the Cavendish forms. The wild varieties of the banana in Malaya (*Musa malaccensis* and *Musa violescens*) have not, up to the present time, been found attacked by the causal organism of Panana disease. If further investigation confirms this immunity, its usefulness in cross-pollination for the development of resistance in some of the desirable banana varieties which exist in the country suggests itself.

Transport Difficulties.

The second point to be considered is the distance of the market from the source of supply. It must be remembered that Malaya is a month's journey from England. The opinion of a prominent authority in London on this subject was sought. He states that he does not think that bananas would stand the journey. There are at present, two classes of boats running from Jamaica; one class brings the bananas in 12 to 13 days and the other in 16 to 17 days,

and the difference of the fruit is very marked. During the course of experiments with regard to another country, bananas were brought to England in good condition after a 28 days' voyage at 52—53°F. but they could not be made to ripen properly. Accordingly, if specially fitted ships were available to carry bananas from Malaya, the fruit would probably arrive in good condition, but would not ripen: they would just go soft and a dirty slate colour. Further, if there is any stem-rot or finger-rot in Malaya, the fruit would not arrive in good condition.

It would appear therefore, that although there is a potential market in the United Kingdom for bananas from Malaya, it is highly improbable that the fruit could be shipped to arrive in good condition.

Australian Market.

An alternative export market for Malayan bananas which has been suggested is Australia. We are indebted to H.M. Trade Commissioner, Singapore and H.M. Senior Trade Commisioner in Australia for the following information (we quote extensively from their memoranda on the subject).

The area under bananas in Australia in 1931 was 21,941 acres, whilst production therefrom was 2,728,982 bushels. Imports of fresh bananas in 1931/32 amounted to 28,721 centals (1 cental = 100 lbs.), approximately half of which were from Netherlands India.

The general tariff on imports is 8s. 4d. per cental to which has to be added surtax and primage duty. There is a preferential duty of 2s. 6d. per cental for imports of a quota of 40,000 centals of Fijian bananas. This rate does not apply to bananas imported from other British territories and any imports from Fiji in excess of the quota would be subject to the full rate of 8s. 4d. per 100 centals, together with further charges of 10 per cent. *ad valorem* primage duty, 2½ per cent. sales tax (from which local growers are exempt) and 4d. per case for inspection fees under quarantine regulations.

The preferential rate of 2s. 6d. accorded to Fijian bananas is found to be too high to permit of any profitable trade, despite the proximity of that territory to Australia, and there is little likelihood of the quota limit being reached as the trade has now virtually ceased.

From the failure of Fiji to attain their quota under the preferential tariff rate, it will be seen how improbable it is that more remote countries could develop any new trade under conditions of the full tariff rates and other charges.

The trade in bananas with Australia, hitherto carried on by Netherlands India, has been confined to Western Australia. This trade appears to have been governed by the fact that, until recently, production in Western Australia was not so large as in other States, and also by the possibility of landing fruit in saleable condition.

As the fruit ripens very quickly, every day in transit, exceeding five or six, is stated to involve an increasing percentage of loss, and with the rapid extension in production of locally-grown bananas under irrigation conditions,

growers in Western Australia are already under-selling and displacing the imported article, while it is anticipated that saturation point will be reached next year. In New South Wales and Queensland, a considerable increase in output is anticipated and warnings have been issued to growers against over-production.

With regard to the market for dried or preserved bananas, there is no trace of any past or present demand for these products. Dried bananas, under present tariff rates, would be subject to a duty of 6d. per lb., while that on preserved bananas is 3 s. per gallon British preferential and 4s. 3d. per gallon general rate.

Acknowledgments.

In the above article, extensive use has been made of a private communication received from Mr. J. G. Hibberd and also of a memorandum supplied to this Department by Mr. R. Boulter, C.M.G., H. M. Trade Commissioner, Singapore, who also forwarded to the Department a copy of a memorandum on the subject prepared by H. M. Senior Trade Commissioner in Australia. Use has also been made of Mr. F. A. Stockdale's Report on his visit to the West Indies in 1932.

The following authorities have also been consulted: Report of the Empire Marketing Board on Fruit Supplies in the United Kingdom (E.M.B. 65), Investigations on Panama Disease in Malaya by F. S. Ward (Special Bulletin, F.M.S. and S.S., Department of Agriculture, Scientific Series No. 2) and Banana Growing in Malaya and the Presence of Diseases by F. S. Ward (*Malayan Agricultural Journal*, Vol. XVIII No. 2, 1930).

ELEVENTH MALAYAN EXHIBITION.

The Eleventh Malayan Exhibition, organised by the Malayan Agri-Horticultural Association, was held at Kuala Lumpur for three days 2nd to 4th June 1934. Rain fell for short period on two days which had some effect on the "gate". The attendance was 22,588, as compared with 20,093 in 1933.

Considerable improvements were made in the layout of the Exhibition; in all section there was plenty of room for visitors to view the exhibits, while the absence of dust owing to improved flooring, added greatly to the general comfort.

The Opening Ceremony.

The Hon'ble Mr. M. B. Shelley, C.M.G., Chief Secretary to Government, in the presence of a distinguished gathering which included their Highnesses the Rulers of Selangor and Negri Sembilan, opened the Exhibition at 11 a.m. on 2nd June.

Before asking Mr. Shelley to open the Exhibition, Mr. F. W. Douglas, President, read a message of good wishes for the success of the Exhibition received from His Excellency The High Commissioner. Mr. Douglas briefly outlined the work of the Association during the past year and the main features of the present Exhibition.

Mr. Shelley reviewed recent developments affecting agriculture in Malaya. He hoped that the better position of the rubber industry caused by the new restriction agreement would not make us drift into that facile complacency with the condition of things which characterised the period preceding the depression.

Allusion was made to recent legislation concerning the Rubber Research Institute of Malaya and to the inauguration of a service of Asiatic rubber instructors who will work towards the improvement of the cultivation and produce of small rubber holdings.

In this connexion, Mr. Shelley suggested the re-introduction of competitions of small-holders' rubber at agricultural shows, which might be organised on lines similar to those of the All-Malayan Padi Competition.

Stress was laid on the value to Malaya of her other agricultural products. Of these, the vegetable oil industry and particularly with reference to coconuts, is experiencing considerable difficulties owing to the low prices for the produce. He hoped that the committee recently appointed by H. E. The Governor would find itself in a position to put forward recommendations which would help to alleviate the position.

The improved statistical position of the local rice industry was mentioned; the campaign to increase the area and quantity of rice grown in Malaya is now beginning to shew substantial results. It is anticipated that the acreage and yield returns of the present season will surpass the record set up last year. It is believed that the additional funds now available for improving present areas and developing new areas will materially assist in the further extension of the rice industry and bring Malaya perceptibly nearer self-sufficiency in the

matter of rice supplies.

The speaker drew attention to recent legislation designed to improve the pineapple canning industry of Malaya; to the padi competitions held throughout the country and to possible expansion of fruit growing.

In conclusion, Mr. Shelley stated that the work the Association is doing deserves encouragement and he therefore commended it for favourable consideration and support.

The Hon'ble Dr. H. A. Tempany, C.B.E., Director of Agriculture, thanked the Chief Secretary for having opened the Exhibition. In a short speech he stressed the importance of the coconut and oil palm industries and reminded his listeners that these two industries are passing through a period that is every bit as difficult as that which rubber experienced during the blackest days of the depression.

He considered that agricultural shows play an important part in any movement for the amelioration and improvement of agriculture. The fact that this Exhibition was larger than its predecessors indicated extending appreciation of the need for diversification of agricultural production. In endeavouring to improve the lot of the raiat, the extended planting of food crops, combined with the production of a diversified range of money crops, form the soundest policy.

Agriculture.

The agricultural section, which this year was adequately housed, was fully representative of the crops grown in Malaya. The total number of exhibits exceeded 4000. Competition in most of the classes was strong, the judges finding it necessary, in some cases, to make additions to the number of prizes offered. Perhaps the most outstanding classes—both for quality and number of exhibits—were those for copra and pineapples. The exhibits in the former class reflected the large amount of instructional and propaganda work towards the preparation of improved copra which during the past year or so has been undertaken by the Department of Agriculture. The exhibits of pineapples shewed how much alive is the Malaya canned pineapple industry and how excellent is the quality of fruit grown for this trade. The display of vegetables grown by school gardens is deserving of praise. The excellence of their exhibits indicates the very great improvement in the standard of school garden work in the past few years. In this section also was a special exhibit staged by the Cameron Highlands Society. It consisted of a wide range of fruits and vegetables grown on the Highlands. The produce was of excellent quality, the asparagus being especially good and provided a good demonstration of the possibilities of fruit and vegetable production for the local markets.

Other classes which were well represented were "gaplek" (sliced tapioca), tapioca flour, tea, coffee, kapok, arecanuts and bananas.

Apart from the display staged by the Cameron Highlands Society and the School of Agriculture, vegetables were below last year in numbers; the quality too was hardly as good.

All-Malayan Padi Competition.

This inovation proved one of the outstanding successes of the Exhibition. About 150 samples of padi, being prize-winning exhibits from fifty District shows held this year, were submitted. Each exhibit was accompanied by a certificate of origin, stating amongst other matters the area cultivated and the yield per acre obtained. As a full account of the organisation of this competition will be found in the next issue of this journal, further comment is unnecessary in the present account.

Poultry.

The poultry section was the largest in the history of these Exhibitions. A total of 582 exhibits were received, drawn from all parts of the country, consisting of 192 poultry, 161 pigeons, 152 eggs, 50 canaries and 27 cage birds.

The organiser of this section is to be congratulated on the most attractive layout of the section.

The most popular breed was the Light Sussex with Rhode Island Reds also in evidence. An encouraging feature was the fact that about 50 per cent. of the exhibits were pure bred birds, bred in Malaya; in fact the Gold Medal for the Best Bird in the Show was won by a Rhode Island Red locally bred.

The best cross-bred bird was Sussex x Rhode Island Red.

The native birds exhibited were stated to be very good—but the less said about the general quality of egg exhibits the better!

Pigs.

There were about 40 exhibits in the Pig Show, a slight increase on last year's entries. There was a considerable improvement in the standard of the exhibits. Most prizes were taken by Chinese pig "feeders" rather than "breeders", who in Selangor—from which State all exhibits were derived—make full use of the pure-bred stock at the Government Stock Farm for crossing with local breeds.

Of cross-bred exhibits the best were Berkshire x Chinese Sow, and Large Black x Poland-China.

Cattle.

This is the first occasion for some years that cattle have been included in the Exhibition. Owing to difficulties of transport and expense to the owners, Selangor provided all the entries. The Section was successful and it is hoped that the organisers will be able to extend it considerably next year.

Cats.

The Cat Show was as usual a feature of the last day of the Exhibition and attracted great interest. There were 44 entries, the largest on record. Pure bred Siamese cats form a prominent class at this annual show. In view of the excellence of this breed in Malaya and to its popularity in other countries it is surprising that the commercial aspect of Siamese cat breeding does not receive greater notice in this country.

Village Industries and Schools.

The importance of village industries in native agriculture is fully recognised by the organisers of this Exhibition, and every effort is made to popularise this Section. On the educational side one saw the exhibits from the Sultan Idris Training College for Teachers—an institution that has done much good work in bringing in the villages skilled instruction and the application of handicrafts for the production of many new and useful articles. The fact that exhibits made in Vernacular schools sell so readily at the Exhibition is proof that the educational side is working on the right lines.

In this Exhibition one not only saw—and could purchase—the articles made in schools, but there were numerous articles of all descriptions made by villagers in their own homes.

In some States, the Government organised the display and sale of the articles produced by the village industries of the State. In this connexion, mention must be made of the attractive displays from Kelantan, Trengganu, and Brunei.

It is understood that sales at the Exhibition were good—running into something like $4,000—a tangible result which should be a sufficient justification for the trouble and expense of the various organisations and Governments concerned.

Space forbids more than a passing reference to a very representative needlework section, the excellent school exhibits and to a section devoted to art and photography.

Horticulture.

The Horticultural Show was somewhat disappointing both in quantity and quality. By this statement no criticism of the organisers of this section is intended; the explanation probably is that owners of beautiful plants and flowers are afraid of damage which handling and transport may occasion.

The import of flowers into Malaya last year was valued at over $6,000, while in 1931 it was nearly $20,000. It is probable that with proper organisation, this country could entirely satisfy the present demand, while it is possible that the local demand could be increased. The Exhibition offered to cultivators at Malayan hill stations an opportunity for advertisement and for opening up new business of which they did not fully avail themselves.

Department of Agriculture, S.S. & F.M.S.

The Department staged a series of instructional exhibits in the permanent building which they share with the Rubber Research Institute of Malaya. The following account illustrates the scope of the display.

In view of recent work aimed at the improvement of native-produced copra, exhibits shewed the system of copra-grading, types of copra and models of improved copra kilns suitable for production of high grade copra from small-holdings. In addition, products manufactured from copra were shewn.

A comprehensive series of varieties of pure strain padi, produced by the Department and suitable to the varying conditions obtaining in Malaya was displayed—a collection which never fails to attract and interest Malay visitors.

Under fruit propagation, exhibits were designed to bring to notice budding and etiolation methods.

Another series of exhibits which proved of great interest were concerned with the production of the tea at Cameron Highlands. Chests of tea of different grades, information on London sales, valuation of grades and comparison with prices of tea produced in other countries, enabled the visitor to review at a glance the present position of the work of the Department in this direction.

A section of the display was concerned with poultry. Models of improved types of poultry houses were shewn, which incorporated the most recent recommendations of the Department and are especially designed to be of use in small holdings. Other exhibits in this section were drinking fountains, food troughs and trap nests. A series of wall illustrations shewed the proper methods of handling poultry and the desirable characteristics to look for in selecting and judging poultry and observing the condition of the birds.

Recent legislation in the Straits Settlements, Johore and the Federated Malay States in connexion with the introduction of measures designed to stabilise and improve the valuable canned pineapple trade in this country led the Department of Agriculture to stage exhibits illustrative of its investigations on this crop in the field, and to display samples with special reference to the proposed grading scheme. In addition, canned pineapples from countries which were actual or potential competitors with the Malayan product were shewn.

Samples of locally manufactured tobacco were staged, together with exhibits shewing different types of leaf and a model flue-curing barn.

Other exhibits were concerned with minor economic products—pepper, coffee, Brazil nut, Avocado pear, mushrooms, arecanuts and cloves. Exhibits of pigs and cattle from the Government Stock Farm were included in the above-mentioned Shows concerning such livestock.

A stall was also allotted to the display of milk from the Government Stock Farm, Serdang, with graphs illustrating its high degree of purity. Samples of fodder grasses and locally-produced feeding stuffs for cattle were also included in the exhibit.

The School of Agriculture, Malaya, occupied a stand in which were shewn the work of the School, the courses of instruction and the life of the students at the School, illustrated by a cinema film. Mention should also be made of the very fine exhibit of agricultural products grown by the students at the school, which was included in the Agricultural Show.

The Department had, in addition, a publication stand from which a range of its publications in English, Malay, and Chinese could be purchased.

Rubber Research Institute of Malaya.

The exhibits staged by the Rubber Research Institute illustrated the principal activities of the various Divisions at the present time, except that no exhibits were staged by the Soils Division.

Botanical Exhibits. The Botanical Division exhibits consisted mainly of a comprehensive series of large charts and diagrams illustrating the comparative yields of budded rubber, ordinary seedling rubber and seedling rubber derived from cross pollination of certain high-yielding clones.

These charts demonstrated clearly the marked superiority in respect of yield of budded rubber and seedling rubber trees derived from seeds of high-yielding clones over ordinary unselected seedling material. The records included high-yielding material derived from Java, Sumatra and Malaya.

A very striking series of enlarged micro-photographs of the latex-bearing tissue of high, low, and medium-yielding trees illustrated important differences in the anatomical structure of the tissue which it is hoped may prove of value in the selection of high-yielding material and also in showing the reasons for variation in yield.

Charts illustrating investigations which are now in progress on various systems of tapping were also displayed, while in addition, various modern tapping systems were also illustrated by means of models consisting of small trunks on which the tapping panels were marked out.

All the charts and diagrams were accompanied by printed narratives describing their essential features.

Pathological Exhibits. The exhibits of the Pathological Division were divided into two; *viz.* (*a*) Root Diseases of the Rubber and (*b*) *Oidium Heveae* Leaf Disease, which represent at the present time the two major activities of the Division.

Numerous specimens of the three principal root diseases—*Fomes lignosus* (White Root disease), *Ganoderma pseudoferreum* (Red Root disease) and *Fomes Noxious* (Brown Root disease) on actual rubber tree roots and also on jungle stumps from which the original infections are caused were staged. The whole exhibit was displayed with a view to illustrating the principal similarities of these root diseases. Printed narratives describing the origin of the diseases, their method of spread and treatment in young and old rubber areas were attached, so that visitors desiring information could readily obtain this from the narratives and the method of lay-out.

Considerable progress in the investigation of these diseases has been made recently at the Institute and the exhibits demonstrated the results obtained and illustrated the methods of treatment advised.

In relation to the leaf disease, caused by the Mildew fungus—*Oidium Heveae*—specimens of rubber tree leaves attacked by the fungus were shown, together with specimens under the microscope and enlarged micro-photographs.

Four of the dusting machines already used on estates in Malaya for treatment or control of the disease by sulphur dusting were displayed, together

with a series of samples of various commercial grades of sulphur powder which have been used for spraying or dusting. Photographs of the sulphur dusting machines in action were also displayed.

Chemical and Technological Exhibits. The exhibits of the Chemical and Technological Divisions may be divided into three, *viz.* (*a*) Latex Exhibits showing one of the principal defects, such as discolouration of the product due to contamination with iron.

In this section also were shown some of the principal non-rubber constituents of latex which have been isolated. (*b*) A complete factory lay-out for the preparation of either air-dried or smoked sheet. (*c*) A comprehensive series of rubber articles, manufactured direct from latex, including a few special articles such as rubber floorings and buckets made direct from raw rubber.

The latex exhibit illustrated recent important investigations carried out at the Institute on discolouration and stability of latex. Excellent specimens of air-dried sheet prepared by a special coagulant from ammoniated latex were also exhibited.

The model estate factory lay-out consisted of bulking and settling tanks, various types of coagulating tanks showing lay-out, a complete working model of a line-ahead sheeting battery (constructed by a local firm)—driven by means of a ½ H.P. electrical motor, and a model of a modern combined hot-air drying and smoke house including dripping and drying racks designed at the Institute and constructed by the same firm.

The essential features of this drying cum smoking house, consist of two chambers in each of which sheet rubber of not more than ⅛ inch thickness can be completely dried or dried and smoked in 48 hours.

A smoked sheet of good deep colour can be prepared by passing smoke for not more than 3 hours in toto into the drying chamber during the 48 hours. drying period.

A series of manufactured articles made direct from latex were included. These articles illustrated a few of the numerous recent applications of latex.

Co-operative Poultry Products Ltd.

The Co-operative Societies Department staged an exhibit of the apparatus used by this Union of Co-operative Egg-Collecting Societies for testing and grading the eggs which are being marketed in several towns of the Peninsula.

In this exhibit explanation and demonstration was given of the methods of candling eggs for freshness and of grading eggs for size and weight. The explanation was supplemented with diagrams and illuminated photographs.

The apparatus on show was similar to that used by the various Co-operative Societies affiliated to this marketing organisation. For nearly three years the Societies have been running efficiently and the apparatus is used by peasants with uniform and satisfactory results.

The Society operates from the Krian District of North Perak where the eggs are collected, candled, graded and packed. The Society has made arrange-

ments for sale of its eggs in Penang, Parit Buntar, Ipoh, Telok Anson and Kuala Lumpur.

Cinema.

As in past years, the staff of the Rural Lecture Caravan showed the propaganda films of the Agricultural, the Co-operative and the Health Departments.

An innovation was introduced this year. By means of a large ground glass screen, daylight shows were given both morning and afternoon at 11 a.m. and 4 p.m. respectively.

This screen was also used by officers of the Agricultural Department to give lectures on Poultry illustrated with lantern slides. The advantage of this arrangement is that the Lecturer can be seen by his audience and can himself see his audience whilst giving the lecture. Attendances at these daylight shows were rather poor because the public has not yet become accustomed to the times of daylight shows and it will be necessary to advertise more vigorously on future occasions.

The continuous evening film shows commencing at 7 p.m. were, as usual, very well attended.

Trade Section.

The Trade Section, which occupied almost the entire main permanent building, proved a great attraction. One is glad to note that although many exhibits were unrelated to agriculture, yet the great majority of firms in this country who trade in goods of an agriculture nature—such as machinery and fertilisers—were exhibitors on the present occasion.

Other Government Departments.

In addition to the Department of Agriculture, three other Government Departments staged exhibits. The Public Health Department has a permanent building of its own at the Exhibition, in which it staged a comprehensive series of instructional exhibits illustrative of the work of the Department.

The Posts and Telegraphs had on view the automatic exchange which will be installed at Ampang at the close of the Exhibition. The work of this exchange and that of a robot fault-finder was viewed by large crowds daily.

The F.M.S. Railway Department exhibited the latest type of second class carriage for day and night travel. The publicity provided should do much to popularise night railway travel by second class passengers, for at a very small extra charge they are provided with a well-appointed sleeping berth—complete with mosquito net!

This cursory record of the Exhibition would be incomplete without some word of appreciation of the Malayan Agri-Horticultural Association and of those ladies and gentlemen who assisted the Association in many ways to make the event a success. To these, to the Association and to individuals concerned with the constant entertainments, such as football, bicycle races, badminton tournament &c. we offer congratulations.

DISTRICT AGRICULTURAL SHOWS.

Lower Perak Agricultural Show.

The Lower Perak Branch of the Malayan Agri-Horticultural Association held an Agri-Horticultural Show at Teluk Anson on 28 April, 1934. In the absence of H.H. The Sultan of Perak the Show was opened by The Hon'ble The Raja Muda of Perak, C.M.G., M.F.C.

The Schedule contained 162 classes divided into 9 Sections.

Many exhibits were of a good standard, but also many fell short of exhibition standard—possibly on account of the fact that no show has been held for some years past.

One hundred and sixteen entries were received for the All-Malayan Padi Competition from which three samples were selected for competition at the State Padi Show and for subsequent despatch for competition at the Eleventh Malayan Exhibition.

The Village Industries Section was well supported and contained a large variety of articles of good workmanship.

The Department of Agriculture staged an exhibit of padi, copra and tea. The Drainage and Irrigation Department staged a model of the first section of the Sungei Manik Irrigation Scheme, an exhibit that attracted considerable attention. The Health Department staged a well-arranged exhibit and organised a Baby Show. The Sultan Idris Training College displayed a wide range of various articles, from attractive lamp shades to specimens of the soap manufactured by the College. The Teluk Anson Malay School also displayed good specimens of its pupils' work, including paintings and hand-work of various sorts.

Not only was the Show well supported in the matter of entries, but it was well attended throughout the day. The Hon'ble the British Resident attended the Show and distributed the prizes in the afternoon.

Bukit Mertajam Agricultural Show.

This show was organised by the District Economic Board, Province Wellesley under the Chairmanship of the District Officer, Province Wellesley.

Owing to the very large number of entries in the All-Malayan Padi Competition, preliminary judging was carried out in the small-holdings, any manifestly bad samples being rejected. Even so, upwards of 100 samples of padi were exhibited at the Show. The general quality was only average and did not compare well with the standard in Penang.

Agricultural and other produce was exhibited in 90 classes, arranged in 8 Sections. The general standard of the agricultural exhibits was very good and it is anticipated that if a similar show is held next year, the number of entries will be greatly increased, since great local interest was aroused by this event.

The Department of Agriculture displayed samples of padi with descriptive cards indicating the qualities to be aimed at for the purpose of the All-Malayan Padi Competition, mushroom cultivation and methods of rat destruction. The Health Department had an extensive series of exhibits devoted to rural hygiene.

About 2000 people attended the Show and local opinion is extremely favourable to the holding of a similar event next year.

Kelantan Agricultural Show.

The second Agricultural Show held in Kelantan took place on 19th May, 1934, at the Central Experimental Station, Kota Bharu.

The number of classes was increased from 30 last year to 41 on this occasion, these being divided into six Sections, one of which was devoted to exhibits from schools.

With the exception of "Miscellaneous" all Sections were well filled and the standard of the winning exhibit was most encouraging.

His Highness the Sultan visited the Show and was keenly interested in the various exhibits, particularly in the display of improvement in smallholders' rubber, fodder grasses, copra improvement, padi, and plant propagation methods staged by the Department of Agriculture.

The Malayan Agri-Horticultural Association kindly donated 6 medals and 6 diplomas. One of the five medals was awarded to the best exhibit in each Section and a certificate to the best exhibits from schools. A silver medal was awarded to the headman of the District which obtained the greatest number of awards.

Temerloh Agricultural Show.

A very successful show, at which His Highness the Sultan of Pahang was present, was held at Temerloh on May 19th. Both the number and quality of the exhibits were on the whole very satisfactory. The entries in the padi section were numerous, though many of the exhibits consisted of somewhat mixed strains owing to the fact that news of the local padi competition could not be made known until after growers had reaped their crops and mixed the padi in the storage bins.

Though many fruits were out of season, there was a good display of pineapples, especially of the Sarawak type, and of bananas. Other prominent classes were those for coconut oil and kapok, and several for different kinds of vegetables. In all these, there were numerous exhibits of which several were of noticeably good quality.

The physical drill competition for pupils from local vernacular schools, water and field sports, were run in connexion with the Show and all were attended by a very large gathering of Malays from all parts of the District.

Departmental.

FROM THE DISTRICTS.

May, 1934.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

The weather during May was, on the whole, hot and dry with a rainfall definitely below the average for the month. There were, however, showers which varied considerably in frequency and intensity in different parts of the country. As a consequence the rainfall in Kedah, Kelantan, Penang and Province Wellesley and northern Perak was only a little below or nearly up to average for the month. On Cameron Highlands there were two wet spells giving average rainfall. In the south, conditions were more irregular. In Malacca rainfall was above average, though the first half of the month was dry. In Johore, Batu Pahat District received twice its normal rainfall, while in other districts conditions varied from normal to very dry. A similar variation in rainfall distribution was experienced in Singapore Island.

Remarks on Crops.

Rubber.—With the official announcement that restriction would be brought into force on the 1st. June, prices rose quickly during the first ten days of the month and there was speculative buying in some districts. Later, when it became known that restriction would be effected gradually, the price declined substantially. The lowest and highest prices in dollars and cents per picul for rubber from small holdings were :—Smoked Sheet $16 to $34; Unsmoked Sheet $12 to $31.50; Scrap $2.50 to $16. Penang prices for Unsmoked Sheet ranged from $24 to $31.50 as compared with $20.50 to $24 in April.

General conditions on small holdings remained the same as in April, improvement in upkeep and in treatment of bark diseases being maintained. The possible effect of the appearance of a holding on the assessment of its production may have influenced owners towards improving the condition of their properties. On the other hand, severe tapping has naturally resulted from the desire to obtain as large a crop as possible at the present satisfactory prices, before the enforcement of export quotas puts an end to unrestrained production.

In Kelantan, the production of fairly clean and dry sheet rubber in preference to wet and dirty slab is making good progress, while the erection of small smoke houses by certain individuals is another step forward.

Padi.—The price of padi at the Government Rice Mill, Bagan Serai, remained at $1.40 per picul, while a private mill paid $1.30 per picul. The

price in Kedah improved somewhat and was equivalent to approximately $1.05 to $1.10 in Kota Star District, while in the Province the range was about 90 cents to $1.25 per picul.

The padi harvest was practically completed everywhere. Estimates made by the Department of Agriculture in Kedah showed that from an area of some 238,460 acres planted with wet padi an excellent crop of about 93,117,000 gantangs was reaped. This is a considerable increase both in planted area and total crop over the record figures for the previous season which in respect of wet padi were 219,010 acres and 74,366,000 gantangs.

In Kuantan District of Pahang, the yield per acre was estimated to be only 180 gantangs. This was probably due to inferior cultivation and lack of attention to weeding, since on the Sungei Blat Padi Test Plot the average yield per acre was nearly twice the figure for the District.

In Malacca, local distribution of selected padi seed has been completed and has amounted to 3,800 gantangs. The demand has been so heavy that part of it has had to remain unsatisfied owing to exhaustion of stocks. It is evident that the selected strains of the local Nachin and Siam padi are rapidly gaining in popularity among cultivators. An application has also been received from one district in Johore for seed of the same selected strains. It is hoped to supply this from Test Plots in other States.

Coconuts and Copra.—The average price of copra showed a slight improvement, ranging in different localities from $1 to $3 per picul. The Singapore price was about $2.40 as compared with $2.30 per picul in April.

In spite of the discouraging effect of the low price, the erection of kilns of the approved type for making copra of good quality continued in various parts of the country. In the Province one more such kiln commenced production, while in Krian three kilns were in operation and a fourth was under construction. In Kelantan a brick kiln was completed and produced copra of good quality. The new kiln built with the aid of Government at Sri Menanti in the Muar District of Johore was formally opened by the State Commissioner; the first copra produced reached a high standard. If the quality of commercial consignments is maintained at that of the first sample, the product is likely to command the top price in Singapore.

In eastern Pahang, one brick kiln has been completed, while in Pulau Tioman three kilns are in course of construction as a result of recent propaganda work in that island.

It is reported that copra in the Bagan Datoh District shows improvement generally. This is attributed in part to the effect of the propaganda work carried out during the visit of the Rural Lecture Caravan and in part to greater discrimination by certain local buyers.

The State Agricultural Officer, Selangor, reports that as a result of the construction of a bund by the Drainage and Irrigation Department to keep out sea water in the mukim of Bagan Nakhoda Omar, yields from coconut palms in that area have shown a marked increase and are now high.

Pineapples.—Heavy crops of fruit were obtained during the month in Selangor, Johore and Singapore Island. In Selangor the second factory commenced working again, in Johore eight factories were working, while in Singapore all the factories were working at high pressure. Prices for fresh fruits in Johore were :—first quality $1.20 to $1.50, second quality 90 cents to $1.20, third quality 60 to 90 cents per hundred. Corresponding prices in Singapore were $1.80 and 80 cents per hundred for first and second quality fruits. In Selangor prices ranged from 70 cents to $1.10 per hundred for large fruit, all fruits below a standard size being counted as half fruits only. From one area on the coast of Selangor fruits were being sold direct to Singapore at $1.80 per hundred.

Fruit.—Durians and mangosteens appeared on the markets in several parts of the conutry. Ripe fruits were obtained more especially in the Settlement of Penang, Larut District of Perak and Batu Pahat District of Johore, although in the latter the crops were poor. In fact, judging by the appearance of the trees, the general fruit crop throughout Johore will be very poor this season. Durians sold at weekly fairs in Krian from Larut District fetched from 5 to 12 cents each. A crop of mangoes and machangs was being harvested in Western Pahang and mangoes from Malacca were being exported to the market in Kuala Lumpur.

Coffee.—A heavy crop of coffee was being harvested in the Kuala Langat District of Selangor. Unfortunately Malays who prepare their own beans of reasonably good quality have been unable to find a market for their produce at reasonable prices and may be forced to revert to the practice of selling cherry to local middlemen for preparation. Coffee prepared by Malays in Kuala Selangor District is sold in various villages in the District and also at times in Klang and in Ulu Selangor District.

Local prices for coffee beans have ranged from $16 to $32 per picul in various parts of the country.

Tapioca.—Interest in the cultivation of this crop in Kedah has been well maintained and some 530 acres have recently been planted. In Malacca also a considerable increase in the planted area has resulted from the erection of a factory at Durian Tunggal. In Negri Sembilan 150 acres of tapioca have recently been planted and two factories, each with an output of about 700 piculs per mensem, are operating in Tampin District.

On the other hand, the area of tapioca interplanted with rubber in Segamat and Kluang Districts of Johore is decreasing rapidly as the rubber becomes mature, and factories are experiencing difficulty in obtaining sufficient supplies of root.

Tobacco.—Prices of sun-dried leaves have varied between $8 and $36 per picul in most parts of the country according to quality, but in Malacca the range was $28 to $50 and in Johore $30 to $70.

The high price in Johore is mainly due to the fact that all supplies of leaf are drawn from the Segamat District, growers elsewhere in the State having been discouraged by the damage occasioned fairly recently by floods or by the uncertainty of finding a market for their produce from previous crops. The result is now a considerable extension of the planted area in Segamat District.

In Kedah some 230 acres of tobacco have recently been planted, tobacco in Baling District being frequently grown as an intermediate crop on padi land. There is also a considerable area of tobacco in Perak.

Kapok.—Fairly considerable quanties of kapok were sold in local markets in Western Pahang at $12 to $14 for cleaned floss, a satisfactory price. There were some good exhibits of cleaned kapok at the Temerloh Agricultural Show. Prices in Eastern Pahang were 7 to 9 cents per kati for uncleaned kapok.

Agricultural Stations.

At the Central Station, Kota Bahru, Kelantan, poultry keeping was commenced with twelve Rhode Island Red Pullets obtained from the Pulau Gadong Station in Malacca, where there are now a fair number of young birds of various ages of both the Rhode Island Red and Light Sussex breeds. These have been produced locally from the stock imported from England last year.

Padi Stations and Test Plots.

Cultivation was commenced and nurseries were sown at the Pulau Gadong Station in Malacca. Work was in the same stage at five Padi Test Plots in other parts of the country, while transplanting was in progress on the two inland Test Plots in Selangor.

At the Sungei Blat Test Plot, Kuantan, Pahang, yields obtained were as follows:—Chendar, a local variety, 435 gantangs; Nachin 66, 320 gantangs; Siam 29, 303 gantangs; Siam 76, 302 gantangs; and Seraup 36, 296 gantangs per acre. These yields were approximately double the local average yield.

From the Telok Changai Station and local Padi Test Plots in Kedah fourteen pure strains were distributed for planting, eight being local selections and six being selections from Malacca and Krian. These are the strains approved for next year's Malayan Padi Competition and their distribution was accompanied by instruction work.

Rural Lecture Caravan.

The Caravan visited five centres in Province Wellesley from May 4th. to 13th. and six centres in Krian from May 14th. to 25th. The subjects dealt with were mainly poultry keeping and improved copra production. Both tours were quite successful.

Refresher Course for Malay Officers.

A Refresher Course for Malay Officers of this Department was held at the School of Agriculture, Malaya, and the Central Experiment Station, Serdang, from April 30th. to May 4th. Instruction was given on poultry, vegetative methods of reproduction, nursery work, and general work on tea and coffee. Certain officers spent one day at the Klang Coconut Station where demonstrations of the approved copra kiln and the method of making good copra were given.

DEPARTMENTAL NOTES.

Visits of Director of Agriculture.

The Director of Agriculture visited Klang, Bagan Datoh, Penang and Province Wellesley with the other members of the Vegetable Oils Committee, of which he is Chairman, on May 15 to 18 inclusive. Meetings of the Committee were held at each of the points mentioned.

Poultry Course.

The National Institute of Poultry Husbandry has arranged a Summer Course of Instruction of four weeks duration, for Colonial Officers on leave, at the Harper Adams Agricultural College, Newport, Shropshire, England.

Messrs. G. E. Mann, M.C., and F. R. Mason, both of this Department, will attend the course during their period of leave in England this year.

Visit to Java.

Mr. J. N. Milsum, Assistant Agriculturist, visited Java between 21 April and 7 May, 1934. The purpose of his tour was mainly to study the position in that country in relation to fruit cultivation, with special reference to methods of raising large quantities of stock for distribution.

He also took this opportunity of examining a number of crops, in particular the preparation of tea by Chinese methods.

Leave.

Mr. F. S. Banfield, Horticultural Assistant, has been granted 5 months and 4 days full-pay leave from 12 May 1934, before retirement on abolition of appointment.

Mr. F. R. Mason, Agricultural Field Officer, has been granted 7 months and 16 days full-pay leave from 16 May 1934 inclusive.

Mr. A. Thompson, Government Mycologist, has been granted 7 months and 8 days full-pay leave from 25 May 1934 inclusive.

Mr. J. Fairweather, Principal Agricultural Officer, Johore, returned from leave on 11 May 1934.

Statistical.

MARKET PRICES.

May, 1934.

Rubber.—The price of rubber reacted sharply to the official announcement on 30 April of an international rubber restriction agreement. The Singapore price for spot loose on that date was 21½ cents per lb.; thereafter the price continued to rise, until on 8 May it was 24¾ cents. The price then fell gradually and at the end of the month was 19¼ cents. The highest London and New York quotations during the month were 7¼ pence and 15 3/16 cents gold respectively. Average prices per lb. for the month were:—Singapore 21.35 cents, London 6.38 pence, New York 13.31 cents gold, as compared with 18.75 cents, 5.65 pence and 11.94 cents gold respectively in April.

Weekly prices during May for small-holders' rubber at three centres are shewn in Table II.

Palm Oil.—The course of the market is shewn in the following table. Basis 5 per cent. f.f.a.

Table I.

DATE	PALM OIL			KERNELS
	L'Pool/Holland/ Hamburg c. i. f. landed weights in bulk per ton £. s. d.	U.S.A. landed weight per lb. c. i. f. New York/ Philadelphia cents gold	L'Pool/Continent c. i. f. per ton net in barrels £. s. d.	Fair Average Malayan Quality c i. f. Landed Weight per ton on Continent. £. s. d.
May 2	10 5 0	2.25	12 15 0	6 5 0
,, 9	10 10 0	2.25	12 15 0	6 10 0
,, 16	9 15 0	2.15	12 15 0	6 12 6
,, 23	9 15 0	—	12 10 0	6 12 6
,, 30	8 10 0	—	11 15 0	6 10 0

Copra.—The Singapore price of copra appreciated somewhat during the month, although there is no evidence of any real strengthening in the price. Sundried copra opened the month at $2.65 per picul, gradually improved to $2.90 by the middle of the month, at which price it remained till the end of the month. The average price per picul of this grade in May was $2.83 as

compared with $2.62 in April. The mixed quality averaged $2.35 per picul as compared with $2.15 in the previous month.

Copra cake was quoted throughout the month at $1 a picul.

Rice.—The average wholesale price of rice per picul during April was as follows :—Siam No. 2 (ordinary) $2.54, Rangoon No. 1 $2.42, Saigon No. 1 (long grain) $2.57, as compared with $2.82, $2.47, and $2.62 per picul respectively in March. Corresponding prices in April 1933 were :—$3.54, $2.95, and $3.22.

The average retail market prices in cents per gantang of No. 2 Siam rice in April were :—Singapore 23, Penang 25, Malacca 24, as compared with 23, 26, and 24 respectively in March.

Table II.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, May 1934.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.			Batu Pahat Johore.				
	3.5.34	10.5.34	17.5.34	24.5.34	2.5.34	9.5.34	16.5.34	2.5.34	9.5.34	7.5.34	23.5.34	25.4.34
Smoked sheet	29.00	27.59	24.89	24.00				27.80	24.58	22.18	22.06	21.00
Unsmoked sheet	24.70	24.41	20.00	17.46						18.00		16.73
Rubber*					25.00	18.34	20.00	8.73	9.53	5.90	6.19	5.30
Scrap	8.06	8.21	6.14	—								

* Wet unsmoked sheet.

Transport by lorry Kuala Pilah to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Kuala Pilah on 31st. May or at Kuala Kangsar on 23rd. and 30th. May.

Tea.—Malayan (Lowland) tea was quoted in London in April at 1s.0¾d. per lb. Average London prices per lb. during April for tea consignments from other countries were as follows:—Ceylon 1s.2.98d., Java 1s.0.82d., Indian Northern 1s.2.07d., Indian Southern 1s.2.28d., Sumatra 1s.0.08d.

Tuba Root (*Derris*).—The Singapore market was essentially a sellers' market; in consequence prices shewed considerable marking up on the previous month's level. Rotenone-containing roots averaged $37 per picul, while roots sold on the ether-extract basis averaged $28.50 per picul, the advances being $4.50 and $2.50 per picul respectively during May.

Coffee.—The Singapore price of Sourabaya coffee remained steady; prices ranged according to grade from $20 to $21 per picul. Palembang coffee averaged $16.19 per picul, as compared with $17.19 in April.

Arecanuts.—Average prices per picul in Singapore were as follows:—Splits, $2.67 to $4; Sliced, $7.19 to $11.69; Red Whole $2.95 to $4.15; Sourabaya Whole, $3.62 to $5.50; Kelantan Whole, $3.47 to $3.71, the price within each range depending upon quality. There were no arrivals of Bila Whole. Average prices per picul quoted by the Singapore Chamber of Commerce were:—Best $4.16, Medium $3.56, Mixed $3.07.

Gambier. Singapore prices shew some improvement over those ruling at the end of April. Average prices per picul in May were, Block $4.25, Cube No. 1, $7.19 as compared with $3.81 and $6.75 respectively in April.

Pineapples.—Sellers were reserved in the earlier part of the month, but more business at slightly lower prices followed as the large crop being harvested came into the market. Singapore average prices per case in May were as follows:—Cubes $3.02, Sliced Flat $2.97, Sliced Tall $3.07 as compared with $3.02, $2.93 and $3.02 respectively in the previous month.

Tapioca.—Enquiry was good at the beginning of the month and prices advanced, but later the market became dull and featureless. Average prices per picul in Singapore during May were as follows:—Flake Fair $4.60, Pearl Seed $5.91, Pearl Medium $6.37, as compared with $4.19, $5.39 and $6 in April.

Sago.—The Singapore market exhibited features similar to that for tapioca. Average prices per picul in May were:—Pearl, Small Fair $4.76, Flour, Sarawak Fair $1.90; average prices in the previous month being $3.74 and $1.81 respectively.

Mace.—The Singapore market for mace and nutmegs was quiet throughout May. Quotations were steady, Siouw at $70 and Amboina at $50 per picul, as compared with $67.50 and $45 respectively in April.

Nutmegs.—On the Singapore market, 110's were quoted throughout May at $22.50, while 80's were $23 per picul. Corresponding average prices in April were $22.50 and $23.50.

Pepper.—The feature of the Singapore market was a sharp advance in price, said to be due largely to speculative manipulation in Europe. The price receded almost as sharply. The market closed with a steadier tone. Average

Singapore prices per picul in May were:—Singapore Black $16.19, Singapore White $34.75, Muntok White $35.75, as compared with $15.25, $29.62, and $30.12 respectively in April.

Cloves.—Singapore prices continue nominal at Zanzibar $35 and Amboina $45 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackey & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.

April, 1934.

Malaya.—The foreign imports of rice in April amounted to 49,580 tons, exports for the month being 10,534 tons. Net imports were therefore 39,046 tons. The net imports for the first four months of 1934 were 148,309 tons, an increase of 17,626 tons, or 13.5 per cent. over the corresponding period of 1933.

Of the imports in April, 42 per cent. were consigned to Singapore, 23 per cent. to Penang, 6 per cent. to Malacca, 22 per cent. to the Federated Malay States and 7 per cent. to the Unfederated Malay States. Of the total, 52 per cent. came from Siam, 38 per cent. from Burma, 9 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during April, 67 per cent. were shipped to Netherlands India and 33 per cent. to other countries. Of the various kinds of rice exported, 57 per cent. was Siam rice, 34 per cent. Burma rice, 4 per cent. Indo-China rice and 2 per cent. local production.

India and Burma.—Foreign exports in March amounted to 223,000 tons. For the first quarter 1934, the total exports were 698,000 tons as compared with 829,000 tons for the first three months of 1933.

Siam.—The exports of rice from Bangkok in April were 135,571 tons: total exports for the first four months of 1934 were 1,392,347 tons, as compared with 1,446,670 tons during the corresponding period of 1933.

Japan.—According to the Ministry for Agriculture and Forestry, (*Trans-Pacific Journal*, 12 April 1934) the stocks of rice in Japan proper on 1 March 1934 amounted to 7,582,600 tons.

The demand and supply of rice during the period 1 March, 1934 to 31 October, 1934, were estimated as follows:—

Supply:	Stock on 1.3.34	7,582,600 tons.
	Imports of Korean rice	666,200 ,,
	Imports of Formosan rice ...	375,900 ,,
	Imports of foreign rice	nil
Demand:	Eight months' consumption (Mar./Oct.)	6,336,600 tons.
	Export	43,500 ,,

shewing a surplus of 2,244,600 tons.

French Indo-China.—Entries of padi into Cholon, January to April amounted to 452,000 metric tons, as compared with 441,000 metric tons during the corresponding period of 1933, an increase of 2.5 per cent. Exports of rice January/April 1934, inclusive were 499,000 metric tons, compared with 502,000 metric tons for the period January/April 1933, a decrease of .6 per cent.

Netherlands India.—Latest available information published in the Summary for March 1934.

Ceylon.—The imports for the first four months of 1934 at 157,915 tons shew an increase of 19,896 tons, or 14.4 per cent. over imports for the corresponding period of 1933. Of 1934 imports, 16 per cent. were from British India, 66 per cent. from Burma and 18 per cent. from other countries.

Europe and America.—Shipments from the East to Europe from 1 January to 19 April, 1934, were 346,202 tons as compared with 458,268 tons for the corresponding period of 1933, a decrease of 24.5 per cent.

Of 1934 shipments, 38 per cent. were from Burma, nil from Japan, 43 per cent. from Saigon, 14 per cent. from Siam and 1 per cent. from Bengal, as compared with 44, 5, 42, 8 and 1 per cent. respectively in the corresponding period of 1933.

During the period 1 January to 26 March 1934, 12,325 tons were shipped from the East to the Levant, as compared with 9,457 tons for the same period in 1933; this is an increase of 30.3 per cent.

To the West Indies and America (1 January to 17 March, 1934) 30,200 tons were shipped from the East, as compared with 27,684 tons for the corresponding period of 1933, an increase in 1934 of 9.1 per cent.

MALAYAN AGRICULTURAL EXPORTS, APRIL, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-Apl. 1933.	Jan.-Apl. 1934.	April 1933.	April 1934.
Arecanuts ...	20,756	7,949	12,547	2,443	2,798
Coconuts, fresh ...	100,609†	30,652†	31,485†	9,043†	9,833†
Coconut oil ...	17,568	6,312	8,331	1,676	2,080
Copra ...	110,543	29,160	33,329	8,258	5,830
Gambier, all kinds ...	2,560	749	693	156	134
Palm kernels ...	1,983	418	862	65	365
Palm oil ...	12,101	2,301	3,912	1,199	1,668
Pineapples canned ...	59,582	17,635	20,660	4,700	6,371
Rubber ...	459,836§	136,056§	163,901§	36,752§	39,484§
Sago,—flour ...	7,648	1,529	3,403	48	66*
,, —pearl ...	2,646	665	1,307	160	541
,, —raw ...	4,420*	1,373*	1,763*	295*	683*
Tapioca,—flake ...	9,881	4,135	2,972	1,080	800
,, —flour ...	702*	64	671*	28	139*
,, —pearl ...	17,297	5,600	5,246	2,135	1,471
Tuba root ...	569½	126	215½	46	65

† hundreds in number. * net imports. § production.

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING APRIL, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1932 (*d*)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,734	1,106	2.5	8,697	19.4	1,048	2.3	9,803	21.9
Dindings	6,,969	115	1.6	1,366	19.6	516	7.4	1,481	21.2
Malacca	111,780	4,724	4.2	20,142	18.0	4,794	4.3	24,866	22.2
Penang Island	1,635	653	39.9	216	13.2	177	10.8	869	53.1
Singapore Island	28,269	5,437	19.2	4,857	17.2	540	1.9	10,294	36.4
Total S.S. ...	193,387	12,035	6.2	35,278	18.2	7,075	3.6	47,313	24.4
FEDERATED MALAY STATES :—									
Perak	250,951	4,744	1.9	39,653	15.8	13,395	5.3	44,397	17.7
Selangor	308,379	5,596	1.8	48,603	15.8	14,160	4.6	54,199	17.6
Negri Sembilan	228,541	6,867	3.0	37,405	16.4	15,793	6.9	44,272	19.4
Pahang	38,141	2,492	6.5	12,071	31.6	6,012	15.8	14,563	38.1
Total F.M.S. ...	826,012	19,699	2.4	137,732	16.7	49,360	6.0	157,431	19.1
UNFEDERATED MALAY STATES :—									
Johore	325,747	15,453	4.7	31,069	9.5	22,232	6.8	46,522	14.2
Kedah (*a*) (*b*)	126,588	10,292	8.1	12,704	10.0	15,574	12.3	22,996	18.1
Kelantan	21,176	1,680	7.9	4,619	21.8	4,163	19.7	6,299	29.7
Trengganu (*c*)	4,643	Nil	Nil	1,609	34.7	200	4.3	1,609	34.7
Perlis (*a*) (*b*)	957	159	16.6	192	20.0	318	33.2	351	36.6
Total U.M.S. ...	479,111	27,584	5.8	50,193	10.5	42,487	8.9	77,777	16.2
TOTAL MALAYA ...	1,498,510	59,318	4.0	223,203	14.9	98,922	6.6	282,521	18.9

Notes :—(*a*) Registered companies only and are rendered quarterly.

(*b*) The figures quoted for Kedah and Perlis are those for end December 1933, and Kelantan end January, 1934 Revised figures will be published when available.

(*c*) Registered Companies only.

(*d*) Figures for end December 1933, are not yet available.

(*e*) Estimated : figures not yet available.

FOR THE MONTH OF APRIL, 1934 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
				during the month	January to April inclusive 1934	during the month	January to April inclusive 1934	during the month		January to April inclusive 1934		during the month		January to April inclusive 1934				
	Ports	Dealers	Estates of 100 acres and over					Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :—																		
Federated Malay States ...	...	16,339	9,813	10,613	45,348	9,794	42,286	Nil	Nil	Nil	Nil	14,066	9,479	62,427	27,584	...	14,254	8,742
Johore ...	...	3,404	3,054	3,759	14,524	5,420	19,329	Nil	3	Nil	16	1,796	7,271	6,570	27,213	...	3,694	2,879
Kedah ...	...	323	1,822	2,586	10,996	1,447	6,493	Nil	Nil	Nil	Nil	1,512	2,732	6,071	12,316	...	378	1,556
Perlis ...	...	14	14	8	51	38	147	Nil	Nil	Nil	Nil	Nil	27	Nil	194	...	27	20
Kelantan ...	...	809	124	224	889	430	3,408	Nil	Nil	319	Nil	109	925	369	4,112	...	389	164
Trengganu ...	...	55	50	246	865	123	431	Nil	Nil	Nil	Nil	Nil	369	Nil	1,296	...	55	50
Total Malay States	...	20,944	14,877	17,436	72,673	17,252	72,094	Nil	3	319	16	17,483	20,803	75,437	72,715	...	18,797	13,411
STRAITS SETTLEMENTS :-																		
Malacca ...	...	3,812	992	1,267	5,277			1		3		3,348		14,040		...	3,582	892
Province Wellesley	...	1,871	435	491	2,123			Nil		Nil						...	2,291	421
Dindings ...	...	74	133	94	420	2,759	10,582	Nil	16,554	Nil	66,597	8,726	Nil	34,080	Nil	...	77	103
Penang ...	1,090	6,928	6	7	44			2,036		8,125						1,777	7,002	4
Singapore ...	6,841	38,608	144	178	688			18,920		63,572		27,191		104,628		9,403	39,249	137
Total Straits Settlements	7,931	51,293	1,710	2,037	8,552	2,759	10,582	20,957	16,554	71,700	66,597	39,265	Nil	152,748	Nil	11,180	52,201	1,557
TOTAL MALAYA	7,931	72,237	16,587	19,473	81,225	20,011	82,676	20,957	16,557	72,019	66,613	56,748	20,803	228,185	72,715	11,180	0,998	14,968

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
20	21	22	23	24	25	26
DRY RUBBER	10,363	32,697	6,403	4,699	1,655	122
WET RUBBER	3,819	6,552	599	1,251	2,039	256
TOTAL ...	14,254	39,249	7,002	5,950	3,694	378

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to April 1934
Singapore ...	37,741	147,278
Penang ...	12,951	53,242
Port Swettenham.	5,491	24,736
Malacca ...	565	2,929
MALAYA ...	56,748	228,185

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January to April 1934
Malay States ... / Straits Settlements	36,316	159,760
MALAYA ...	36,316	159,760

Notes :—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption. *i. e.*, Column [9] = Columns [15] + [16] + [19] + [20] + [21] + [22] —[4]—[5]—[6]—[7]—[11]—[12]. For the Straits Settlements, Columns [9] and [10] represent purchases by dealers from local estates of less than 100 acres, reduced by 15 % to terms of dry rubber.

3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15:% wet sheet, 25% scrap, lump, etc., 40 %; stocks elsewhere are in dry weights as reported by the dealers themselves.

4. Domestic exports are estimated by deducting the average monthly dry weight of foreign imports over a period of 2 months from the gross foreign exports of the later month.

5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 26 May, 1934.

METEOROLOGICAL SUMMARY, MALAYA, APRIL, 1934.

Locality	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes						Total		Most in a day	Number of days					Total	Daily Mean	Per cent
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.								
Railway Hill, Kuala Lumpur, Selangor ...	91.2	72.5	81.9	95	70	85	75	84.6	85.0	15.52	394.2	3.48	24	21	10	7		182.35	6.08	50
Bukit Jeram, Selangor ...	88.1	72.7	80.4	90	71	85	74	84.5	85.9	6.86	174.3	2.56	17	13	2	1	1	209.20	6.97	57
Sitiawan, Perak ...	89.0	72.9	80.9	91	71	78	75	84.1	84.7	3.32	84.3	1.37	20	10				209.25	6.97	57
Temerloh, Pahang ...	91.0	73.0	82.0	93	71	87	75	85.9	85.7	7.35	186.7	2.69	15	13				216.05	7.20	59
Kuala Lipis, Pahang ...	89.7	72.1	80.9	92	69	87	74	84.5	84.3	9.65	245.1	3.58	19	17	2	19		193.45	6.45	53
Kuala Pahang, Pahang ...	86.6	74.0	80.3	89	72	83	77	84.6	84.4	8.99	228.3	4.56	14	12	2			265.45	8.85	73
Mount Faber, Singapore ...	86.6	73.6	80.1	90	70	77	76	82.2	81.8	3.62	92.0	0.82	16	12	3			191.35	6.38	52
Butterworth, Province Wellesley ...	88.2	74.0	81.1	90	72	82	76	84.5	85.6	6.66	169.2	2.42	15	12	1			211.55	7.05	58
Bukit China. Malacca ...	85.4	73.9	79.7	91	72	83	76	83.7	83.7	4.31	109.5	2.69	12	8	1			200.85	6.69	56
Kluang, Johore ...	88.9	71.2	80.1	92	68	81	73	82.2	81.7	10.20	259.1	1.75	19	15	3	7	1	175.45	5.85	48
Bukit Lalang, Mersing, Johore	86.1	71.9	79.0	90	69	80	74	81.9	81.0	4.01	101.9	1.15	15	12		3		227.30	7.58	62
Alor Star, Kedah ...	90.2	73.1	81.7	94	68	85	76	86.1	85.5	8.40	213.4	2.20	18	16	17	5		231.95	7.73	63
Kota Bahru, Kelantan ...	89.1	72.6	80.9	92	65	84	75	83.9	83.6	4.41	112.0	2.50	10	7	2			277.00	9.23	76
Kuala Trengganu, Trengganu	88.1	72.2	80.1	91	68	85	75	84.0	83.9	3.27	83.1	0.93	7	6	2	4		278.30	9.28	76
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. Pahang ...	73.5	62.6	68.0	77	59	71	64	71.5	71.6	10.73	272.5	1.68	23	21	8	10		138.55	4.62	38
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	72.5	56.1	64.3	76	49	69	62	69.2	69.1	12.91	327.9	1.56	26	24	1			109.85	3.66	30
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	71.6	59.8	65.7	75	57	67	62			13.76	394.5	2.31	26	24	1			125.30	4.18	34